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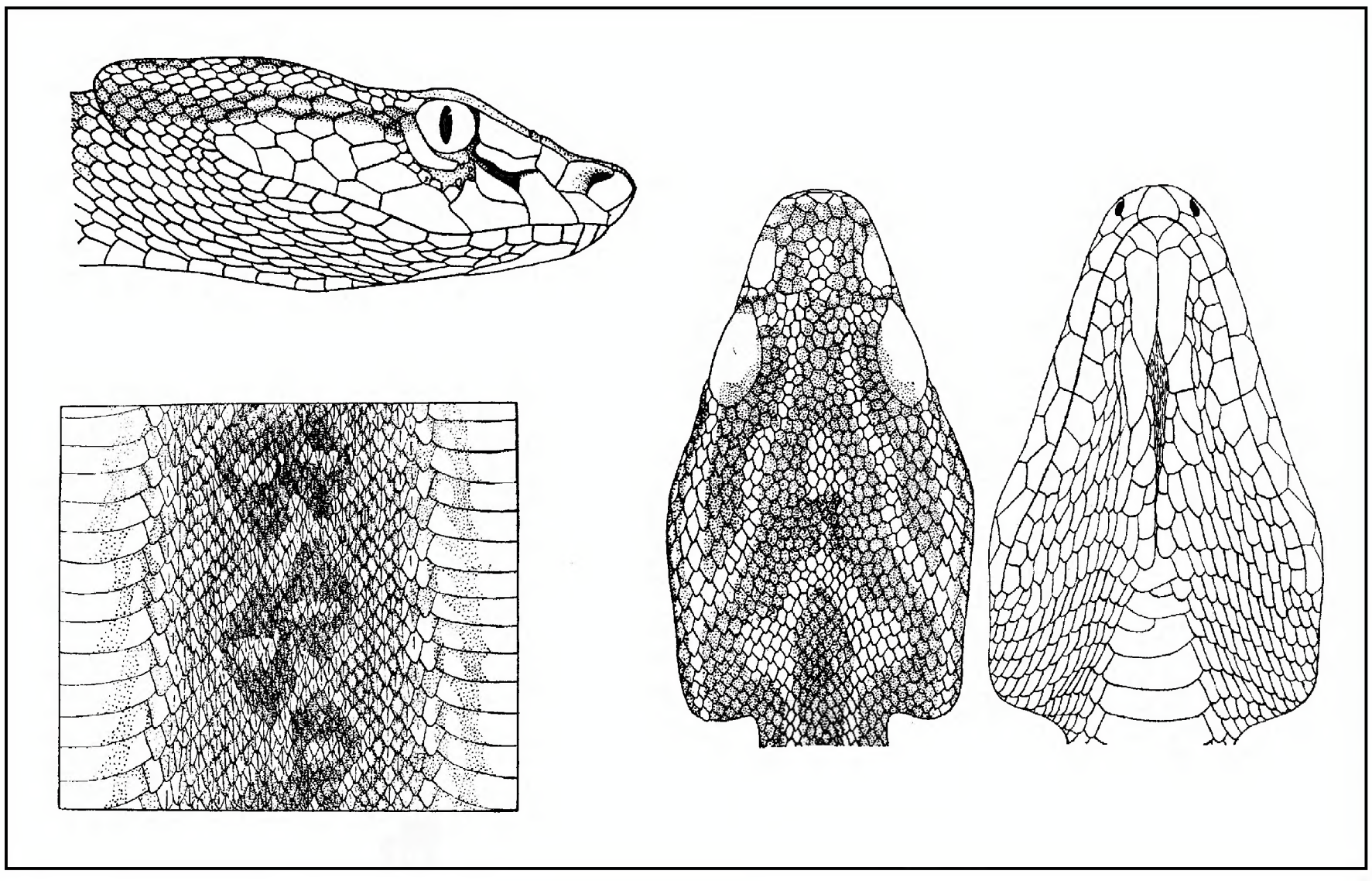

BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
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The Okinawa Habu

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Introduction

Several years ago (1990–1997) I was privileged to serve with the U.S. Navy on Okinawa, Japan. After arriving, because of my interest in reptiles, especially snakes, I garnered as much information as possible on the local herpetological fauna. Very quickly it became obvious a snake called the habu (pronounce "ha-boo") was by far the most well-known and respected reptile on Okinawa. Outside of the Japanese Ryukyu Islands (Figure 1); however, the habu appears to be virtually unknown. (Interestingly, the Mintons chose the habu for the dust jacket of their *Venomous Reptiles* [Figure 2]). Despite its relative obscurity, *Trimeresurus flavoviridis* sizably impacts the local economy and even has a government research institute devoted to its study. This paper will discuss both the habu and Okinawa Department of Health Science's Habu Research Section.

Description

As the Latin specific name *flavoviridis* implies, habu are dorsally yellow (L. *flavus*) and dark green (L. *viridis*) snakes; rough figure-eight and loose Y-shaped black blotches decorate their backs (Figure 3). The underside is unpatterned and off-white in color. This coloration, although drab, provides ideal camouflage for habu in their native jungle habitat. Habu are pitvipers, with a laterally compressed head that is distinctly triangular in shape. The head alone readily distinguishes them from almost a score of other snake species that inhabit Okinawa and surrounding islands. The habu is the largest viper/pitviper of Asia, with some individuals growing to almost 8 feet. Its substantial adult length coupled with its reputation for being irascible make the habu a potentially deadly snake.

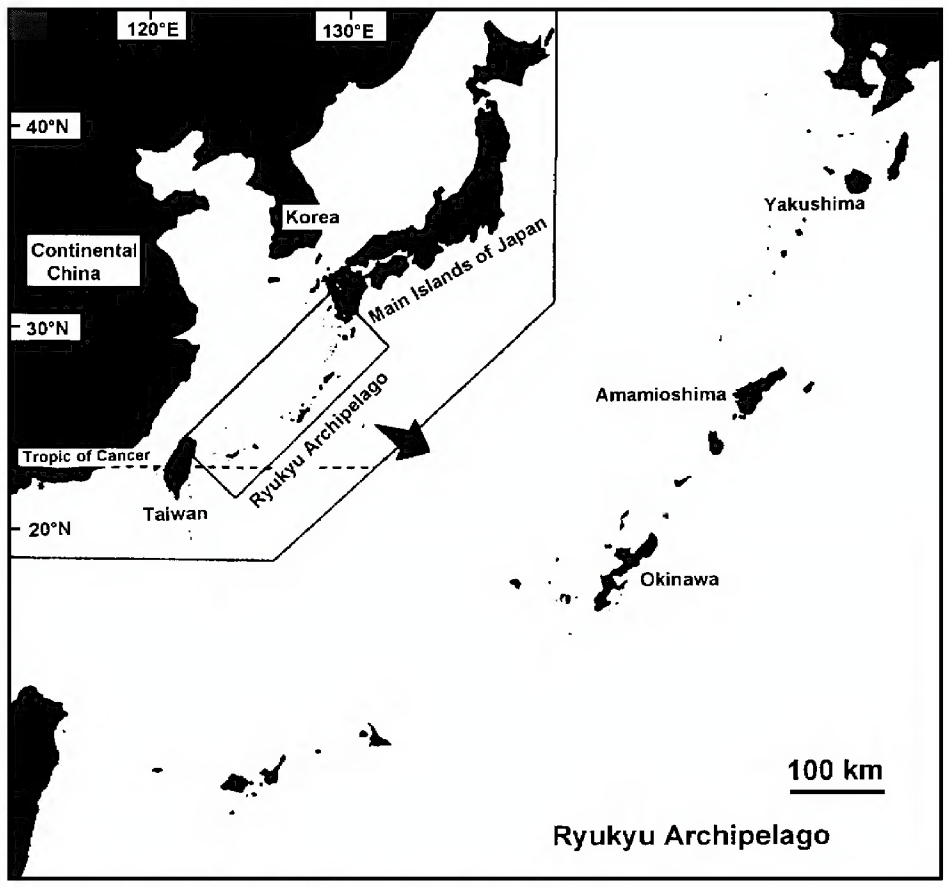

Figure 1. The Ryukyu Islands archipelago.

Natural History

Habu are nocturnal and active year-round, although they are most active between April and November when air temperature averages over 20°C (70°F). As nighttime ambient temperatures near 15°C (59°F), habu become inactive or crepuscular. They are not considered true hibernators because they will emerge from their dens if air temperatures become unseasonably warm. As far as diet is concerned, habu, like most venomous terrestrial snakes, are avid rodent consumers and close to 90% of their diet is composed of these animals. The remainder of the habu diet consists of birds, lizards, and even insects.

Concerning diet, one source on the Internet (reader beware: http://members.tripod.com/wellsking/Worldrec17.htm) claims the Okinawa habu holds the world record for fasting for any vertebrate. This record allegedly occurred at the Amami Kango Pit Viper Center in Naze City, Japan, during an experiment in which five habu were purposefully starved. Four of the hapless snakes died during various times of the experiment; however, one was still alive after an incredible 1189 days (3 years, 3 months) despite a weight decrease of 61%. For whatever reason the experiment was terminated at this point and the snake was gradually restored to full health.

Habu are strictly terrestrial or arboreal and thrive in any area that offers adequate protection and food, but prefer forested areas, traditional rock walls lacking mortar (used extensively throughout Okinawa), or agrarian environments. One source claims habu occupy 85% of the main island of Okinawa. Apparently only the densely populated city of Naha, larger communities with little vegetation, and military bases with cleared land offer inadequate "habutat." Habu may be encountered on roads winding through preferred habitat, especially after summer rains. During the warmer months habu hunters may be seen driving slowly down back roads shining spotlights into trees in search of the potentially deadly serpent. Fifteen recorded bites in 1994 were to people attempting to capture the habu.

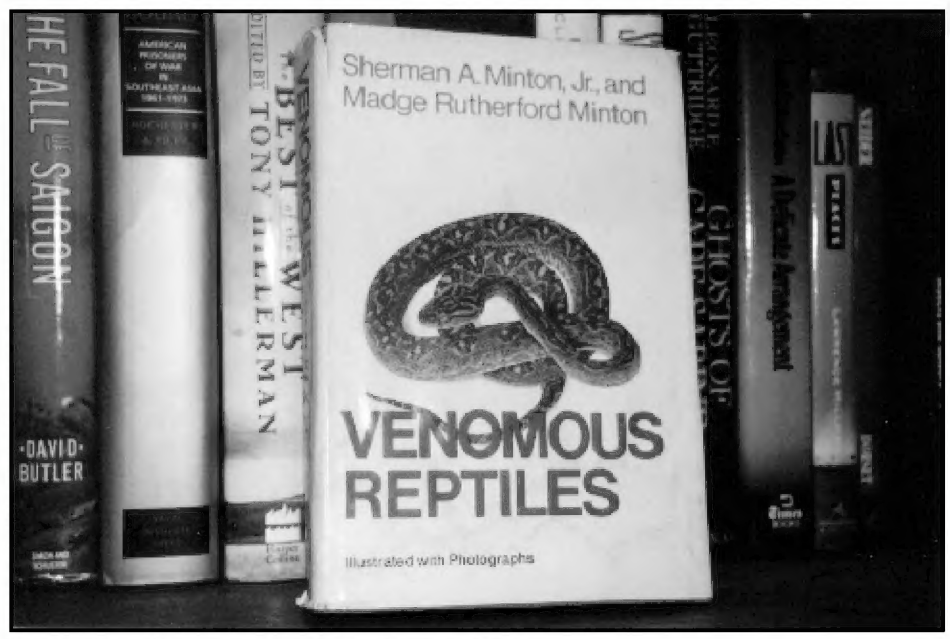

Figure 2. Dust jacket with photo of habu.

Table 1. Examples of lethal dose 50% (mg/kg) for the habu and other snakes. IM = intramuscular (injection into muscle); IV = intravenous (injection into vein); IP = intraperitoneal (injection into abdomen); SQ = subcutaneous (injection between innermost skin layer and muscle or adipose tissue).
Sources: http://mysite.mweb.co.za/residents/net12980/ld50tot.html; http://www.kingsnake.com/toxinology/LD50/ld50iv.html; http://www.kingsnake.com/toxinology/LD50/ld50ip.html.

Scientific name	Common name	IM	IV	IP	SQ
Agkistrodon contortrix contortrix	Southern copperhead	20^	10.9	10.9	25.6
Agkistrodon piscivorus	Cottonmouth	-	4	5.1	25.8
Bitis gabonica	Gaboon viper	5.2	6.72	1.59	12.5
Crotalus atrox	Western diamond-backed rattlesnake	20	2.72	5.59	18.5
Crotalus scutulatus	Mojave rattlesnake	-	0.19	0.16	-
Dendroaspis viridis	Western green mamba	-	0.8	0.33	0.7
Laticauda laticauda^^	Banded sea krait	-	0.16	-	-
Ophiophagus hannah	King cobra	-	1.31	1.64	1.7
Oxyuranus scutellatus	Coastal taipan	-	0.013	0.009	0.107
Trimeresurus flavoviridis	Habu	-	3.69	5.07	-
Trimeresurus okinavensis	Hemi-habu	-	3	15	-

^ *A. c. laticinctus*.

^^ *L. laticauda* has small, brittle teeth and therefore is not able to deliver an intravenous bite on a human being. It is ubiquitous in the waters surrounding Okinawa.

While the majority of venomous snakes are viviparous, habu go against the grain by being oviparous. The habu reaches sexual maturity in three years and copulation occurs from February through May. The female delivers a clutch of 3–17 eggs usually in July or August. The hatchlings, which average almost 40 cm in length, emerge in late August to October, with a presumed hatch rate of 70%. The longevity record for a captive habu is 22 years.

Distribution

Habu inhabit only the Okinawa and Amami island chains within the Ryukyu Archipelago, which stretches roughly from the main Japanese island of Kyushu south to Taiwan. The Ryukyu Islands enjoy a temperate to subtropical environment that supports an agrarian economy based on sugar cane and pineapple. Tourism (650,000 nonresident visitors a year), fishing and U.S. military personnel are also major contributors to the economy. Okinawa is densely populated, with a population of 1.5 million on the roughly 500-square-mile main island; however, most of this population is located in the southern fourth of the island.

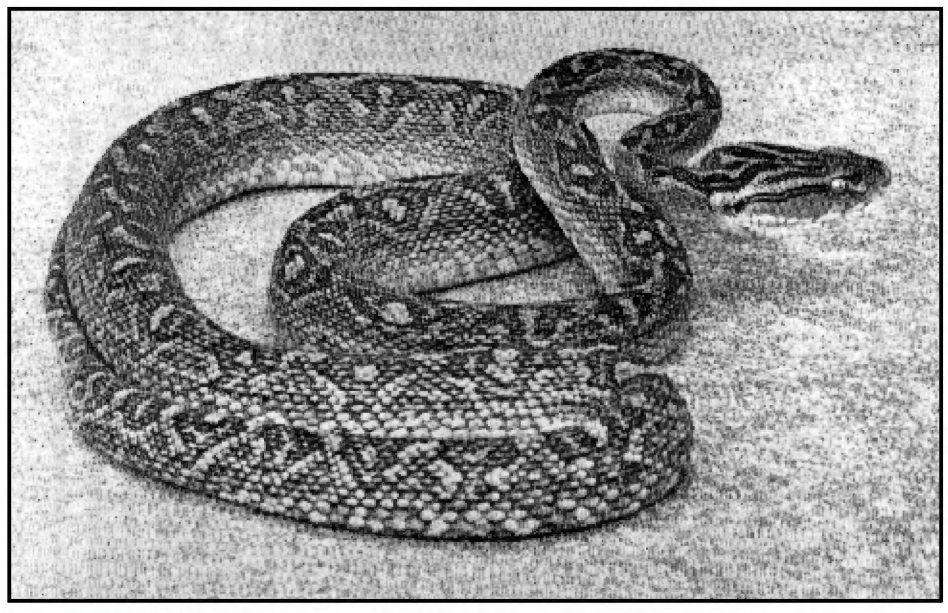

Figure 3. Okinawa habu, *Trimeresurus flavoviridis* (photo courtesy of U.S. Navy).

Despite being geographically restricted, the habu has nevertheless flourished. Even in densely populated areas of Okinawa there are reports of habu entering homes, haunting gardens and being killed on roadways. One source claimed 10,000 habu a year are used to provide leather goods, habu awamori (rice wine containing a pickled habu that allegedly increases longevity, prosperity and sexual prowess), live specimens for snake shows, and other commodities for the tourist industry. The going rate for habu in 1996 was ¥5000 (about $50) apiece and as there are no commercial habu breeding facilities all specimens are caught in the wild.

Habu Venom Toxicology and Morbidity

Habu possess hemorrhagic venom and between 0.1 to 0.5 ml is injected during a "wet" bite. One Japanese booklet for English speakers states, "when you are bitten by habu, you feel severe paralyzing pain as if you were beaten strongly with a rod." Although there are undoubtedly better descriptions of snake envenomizations, this statement conveys the sense of the excruciating pain that must accompany a wet habu bite.

Table 1 compares the "lethal dose 50" (LD_{50}) of the habu to other venomous snakes (LD_{50} is the amount of venom that will cause 50% of test animals to die after injection). Unfortunately, most LD_{50} data are based on intravenous or intraperitoneal injections, rather than subcutaneous or intramuscular. Because the vast majority of venomous snakebites in humans are intramuscular or subcutaneous (depending on the muscle versus

Table 2. Number of recorded bites and deaths from habu from 1947 through 1994.

Years	Number of Bites	Number of Deaths	Ratio of Deaths to Bites
1947–49	1288	19	1:68
1950–59	2796	44	1:64
1960–69	3509	35	1:100
1970–79	2925	19	1:154
1980–89	1888	3	1:629
1990–94	1490	1	1:1490

adipose tissue volume of distribution and snake fang size) it would be more useful to have this information. This, of course, is not practical so extrapolations from animal models to humans may be made. Also keep in mind, although the table gives an overall idea of potential lethality, absolute deadliness must consider snake size, amount of venom yield, fang size, and other factors.

The bottom line, regardless of the merits of LD_{50} data, is that habu are unquestionably deadly serpents. According to Okinawa prefecture records, habu were responsible for 123 deaths out of 12,844 recorded bites between 1947 and 1995 (Table 2), but only five occurred between 1979 and 1994. In comparison, about 800 rattlesnake bites are reported annually in the U.S., resulting in one to two deaths (http://wellness.ucdavis.edu/safety_info/poison_prevention/poison_book/rattlesnake_bites.html#deadly). Unfortunately, approximately 5% of habu bites are severe enough to require prosthetics.

The vast majority of habu bites involve body extremities and occur during sugar cane cultivation or other farming related activities; nevertheless, bites also commonly occur while people are gardening or going on walks. Because many Okinawans leave their windows open during the warmer months and have single story houses, a few habu bites occur in rest rooms or *tatami* rooms (i.e., sleeping/living rooms) every year. Further, since the habu is an avid climber, there are a few hapless victims annually who incur head bites (two in 1994), a testament to habu temperament.

Figure 4. Habu-Knock will allegedly "knock off" habu in 15 minutes.

The Habu Research Section of the Okinawa Department of Health Sciences

The number of recorded bites and deaths attributed to the habu has declined over the years. This has been the result of an intense effort by the Okinawa Department of Health Science's Habu Research Section, which in 1996 employed five full-time employees, had several research buildings, an alfresco experimentation yard, and a well-maintained serpentarium. Founded in 1966, the Habu Research Section is heavily involved with almost every conceivable aspect of the habu. The efforts of the Section have resulted in a habu antivenin; a potent habu spray which allegedly kills habu within 15 minutes after an adequate spraying (Figure 4); and a comprehensive control/conservation campaign. The Habu Research Section's 7-year effort to train dogs to track down the habu in populated areas was unsuccessful as of 1996. Although canines were able to visually distinguish the habu from other native Okinawa snakes, they could not differentiate the smell of habu from other snakes.

The Habu Research Section also spearheads the Okinawa Prefecture Government's official Habu Awareness Months of March and October, statistically when most habu bites occur. During these months the Section will run "habu awareness" advertisements in newspapers and hold educational sessions for school children (Figure 5). Additionally, it conducts habu seminars for construction and electrical companies, agricultural businesses, municipalities, civic organizations, and American military personnel.

The Habu Research Section also provides assistance to local town governments in order to control the habu within populated areas. Such things as traps and drift nets are lent to local governments in order to capture habu. Captured snakes are either released in the jungle or kept in the Section's serpentarium. The Section's efforts have also augmented certain public works projects; for example, encouraging the erection of flat, concrete walls versus the traditional stone walls that the habu frequents.

Malgré its having developed an habu antivenin and educational program that have directly contributed to the dramatic decrease in habu-related fatalities over the years, the Section continues to conduct exhaustive research on habu. For example, as of 1996 it was researching the effect of sound waves on hindering habu movement, something akin to the wireless fence used on dogs. The organization was also trying to develop a monoclonal antibody based antivenin as an alternative to the current horse serum product. It is not known what percentage of antivenin recipients experience adverse reactions such as serum sickness or anaphylaxis to the current horse serum derived antivenin.

Figure 5. Example of literature published by the Habu Research Section.

Habu Folklore

In order to keep the potentially lethal reptile at bay, some Okinawans will cultivate certain plants in their gardens or sprinkle sulfur in their lawn. Other people believe that if an akamata (*Dinodon semicarinatus*, a 4- to 5-foot-long, irascible colubrid that roughly resembles a western long-nosed snake), is present it will ward off habu; however, the akamata is not ophiophagous. Local folklore has it that if one dreams of snakes (including the habu) it is an omen that one is about to receive wealth; the more snakes in the dream, the more promising the somnolent sign. Conversely, the presence of snakes in one's house is a talisman of imminent misfortune; in the case of the habu, this is not farfetched!

Other *Trimeresurus* Species

In addition to *T. flavoviridis*, there are three other *Trimeresurus* species that inhabit the Ryukyu Islands. The hime-habu (*T. okinavensis*) is a short, squat, brown snake with dark blotches that inhabits littoral environments of the Okinawa and Amami islands. There are no reported deaths from the bite of the hime-habu. The northern cousin of the habu is the Tokara habu (*T. tokarensis*), which inhabits a couple of islands in the Tokara island chain (between Amamioshima and Yakushima on Figure 1). It is much smaller than the habu, but very attractive, as it has a white to orange coloration decorated with irregular dark dorsal marks. There are no reported deaths resulting from the bite of the Tokara habu. Lastly, inhabiting the southernmost islands of the Ryukyu Archipelago is the Sakishima habu (*T. elegans*). The Sakishima habu is a beautiful snake that grows to 5 to 6 feet. It is apricot to beige in color, with evenly distributed figure-eight back marks. There is also a melanistic version of the Sakishima habu that has mandarin colored eyes and an odd orange scale here and there. It is a startling snake to see. There is one reported death from the Sakishima habu. [Editor's note: For the most part recent authors have placed the hime-habu in the genus *Ovophis*. And *T. flavoviridis*, *T. tokarensis* and *T. elegans* have been assigned to the genus *Protobothrops* by some. But until the relationships among these species have been more fully studied, it would seem to make sense to refer to them all as *Trimeresurus.*]

Internet Sites

For more information on the Habu Research Section visit:

http://www.pref.okinawa.jp/syakaihosho/III-e.html

http://www.c-okinawa.co.jp/eikanken/english/english.htm

For color photographs of habu visit:

http://www.swissherp.org/Reptiles/Crotalidae/Protobothrops_flavoviridis.jpg

http://village.infoweb.ne.jp/~fwic4591/snake/kusarihebi/text/ehabu.htm

Conclusion

In summary, the habu is an interesting part of the Okinawa fauna and indelible part of Okinawa culture. Although it inhabits only a few islands in the Ryukyu Island archipelago of Japan, it has thrived. Bites and deaths from the habu have declined over the years largely because of the advent of an habu antivenin and vigorous educational campaigns developed by the Habu Research Section of the Okinawa Department of Health Sciences.

Sources

The primary source for this article was *The Handbook for the Control of Habu, or Venomous Snakes, in the Ryukyu Islands* published by the Okinawa International Center of the Japan International Cooperation Agency. Also, interviews were conducted with Habu Research Section staff through Ms. Zamami of the U.S. Naval Hospital Okinawa. Bite statistics were taken from a Japanese language booklet on snakebites on Okinawa available through the Habu Research Section.

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Numismatic Herpetology: Emblematic Herpetozoans

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Abstract

We have previously described the herpetological coats of arms of Jamaica and Mexico. Now we point out the presence of reptiles on the coats of arms of Lesotho, Seychelles, and the Solomon Islands. Also, dragons occur on the coats of arms of Denmark, Iceland and Macao. Numismatic herpetologists will, therefore, want to pay particular attention to these countries. A caduceus has been used since 1806 as a privy mark by the Utrecht mint of the Netherlands, and this device occurs on all coins struck at that mint, including coins struck there for use elsewhere (e.g., in Dutch colonies). Euro coins struck at the Utrecht mint continue to bear the caduceus; and two series of coins are involved, those struck for the Netherlands and those struck for Luxembourg. Hence, the euro experiment has a welcome herpetological aspect.

Previous papers have pointed out that herpetozoans have been parts of national emblems in the ancient world (e.g., Aegina, Chiszar et al., 1996) as well as in the modern era (e.g., Mexico, Chiszar and Smith, 1996; Jamaica, Chiszar et al., 1996). Here we add several other items to this list, including cases in which herpetozoans are numismatically emblematic as mint marks rather than as devices within coats of arms.

The Kingdom of Lesotho (formerly the British Colony of Basutoland, independent since 1966), located within the Republic of South Africa, covers 11,720 square miles and has a human population of about 1.5 million. Its coat of arms contains a centrally located crocodile. Not all coins of Lesotho bear the coat of arms, but many do so, including some common small-denomination pieces as well as bullion coins (i.e., non-circulating legal tender).

The Indian Ocean Republic of Seychelles, a British Colony until 1976, adopted a coat of arms containing devices that allude to each of its constituent island groups. One of these devices, very small at the bottom of the shield, is an Aldabra tortoise. Several Seychelles coins are well-known to herpetologists because they have large images of diving sea turtles, but since the coat of arms appears on most issues, virtually all Seychelles coins are relevant to herpetological collectors.

The Solomon Islands incorporate a crocodile in their coat of arms. After a complex early history through World War 11, the Solomon Islands became a British Protectorate, achieving independence in 1978. Although the crocodilian coat of arms does not appear on many coins of the Solomon Islands, it occurs often enough to deserve recognition by herpetologists. All of the 50 cent pieces have the coat of arms, and one 10 dollar issue (1983) contains it. The image shows up also on two gold bullion coins (denominated at $100) issued in 1983 and 1998.

Dragons occur in several coats of arms, the most famous being the Saint George device centered within the breast of the double-headed eagle of czarist Russia (Chiszar et al., 1997). The red dragon of Wales might be more ancient, as it is believed by some to have been inspired by a Roman legionary standard during or before the fifth century of the common era (Royal Mint, 1995). Contrasting these images allows us to see the two roles of dragons: symbolic of evil being vanquished by good; and, symbolic of the kingship's qualities of strength and authority. The latter type of dragon has much in common with oriental dragons seen in 19th and 20th century coins of China, Japan, Korea and Vietnam (and on many older objects from these nations), whereas the former has its roots in Christian demonization of serpents following the time of Constantine the Great (288–337 AD). Dragons have been used repeatedly in both ways. Several German states (e.g., Mansfeld and at least six federations it entered into) have used Saint George and the dragon of evil on their coins, as have England and various members of the United Kingdom, especially the gold-producing states of Australia, Canada and South Africa. Kingship dragons are most thoroughly associated with the Orient, but we also see their deployment in the numismatic heraldry of Denmark (at least 19 issues since 1800) and Iceland (at least 16 since 1800). Not surprisingly, kingship dragons were incorporated into the coat of arms of Macao (at least seven issues since 1800), blending the European (Portuguese) and Chinese traditions of that enclave. Many coin issues without the coat of arms nevertheless contain dragons or snakes, reflecting Chinese lunar traditions. Now that Macao has become a Chinese territory (1999), ordinary Chinese money will be used, and the former coat of arms will disappear from Macao coinage.

Turning to mint marks, we recognize that the most common herpetological one is the caduceus, a device that has been used in this context since ancient times. In eighteenth century France, a caduceus appeared as a privy mark (a very small device that denoted the mint director) on coins from the Bordeaux mint (1790–1793) and from the Lille mint (1795–1840). During the nineteenth century, the Utrecht mint of the Netherlands adopted the caduceus as its official mark and all coins struck there bear a tiny caduceus plus another mark indicating the identity of the mintmaster. These facts assume even

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greater significance when it is realized that the Utrecht mint struck coins not only for the Netherlands but also for various colonies such as Netherlands East Indies, and this continued (until 1952) even after Indonesia became independent. Coins originating at the Utrecht mint continue to serve the needs of the Netherlands Antilles, and such coins have served in Surinam during most of the twentieth century.

Some countries that were not Dutch Colonies nevertheless have contracted with the Utrecht mint to provide coins. Lebanon, for example, was a French Protectorate and received most of its coins from the Paris mint, but a few issues were struck at the Utrecht mint and carry a caduceus privy mark (e.g., 25 piastres, 1952, 1961). Likewise, the Utrecht caduceus can be found on a few issues of Luxembourg's coinage (e.g., 2½ centimes, 1901 and 1908), reflecting a historical union between Luxembourg and the Netherlands (Treaty of Vienna, 1815). This connection remains visible in the year 2002 as Luxembourg and the Netherlands issued euro coins (1, 2, 5, 10, 20 and 50 cents; 1 and 2 euros). The Utrecht mint struck these coins, and the caduceus appears on all of the denominations for both countries. These caducei are very small, but they are invariably present, giving numismatic herpetologists something to collect in the otherwise herpetologically barren euro experiment. While a collection of caducei on coins might not appeal to some herpetologists, this symbol blends beautiful ophidian symmetry with a long history in myth and practice (Chiszar and Smith, 1998). Consequently, the image is dignified and we may take heart that "Euroland" has incorporated it into two of its twelve sets of coins.

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Bull. Chicago Herp. Soc. 38(2):30-31, 2003

Blanding's turtle was named in honor of Dr. William Blanding because he provided the specimen upon which the scientific description of the species was based. Kit Vernon, the author of this biographical sketch, is the great-great-great grandson of William Blanding's brother-in-law. Blanding's journal describing his 1838 travels to what was then the Far West was passed down through the generations to Kit. It seems likely that the turtle mentioned in the journal became the type specimen of Emydoidea blandingii. *Many thanks to Ellin Beltz, who suggested to Kit that he submit this article to the* Bulletin.

Scraps from a Journal Out West in 1838 by William Blanding, M.D.

Kit Vernon
Kit & Co.
1749 N. Prospect Avenue
Milwaukee, WI 53202

Introduction

William Blanding was a physician, druggist and naturalist in the early-to-mid 19th century. Born in Rehoboth, Massachusetts, February 7, 1773, his family apparently came to Boston in the late 1630s. He was a graduate of Brown University (1801). An oil portrait of William Blanding ("distinguished for his zeal in the study of natural history") hangs at Brown.

He and his brother Abram emigrated to Camden, South Carolina, in the early 1800s, where he was in medical practice, and was also a druggist, for at least 20 years. During his time in South Carolina he studied plants, animals, fossils, archeology and more. A number of his papers are in the Library of the University of South Carolina.

His first wife having died of the fever, he remarried in Philadelphia. He and his brother were not in sympathy with slavery, which brought them into some conflict in South Carolina. Since his second wife, Rachel, preferred to live in Philadelphia, they settled there before 1835. In 1838, they lived at the corner of 5th and Willow Streets.

William Blanding died October 12, 1857, in Rehoboth.

The trip

On May 2, 1838, William and Rachel Blanding began the journey outlined in "Scraps from a Journal Out West," traveling by steamboat down the Ohio, then up the Mississippi. After arriving at St. Louis, they and other passengers hired the boat to continue north to Fort Snelling, on the site of current-day Minneapolis. At that time, Fort Snelling was the furthest west outpost of the U.S. government.

Throughout the trip, Blanding filled his journal with observations on everything from weather to anthropology and archeology to botany to fossils to farming practices. He frequently sketched sights he found interesting. Along the way he collected numerous specimens, which he either shipped home or prepared and took with him.

They returned to St. Louis, and then took another steamboat up the Illinois River to Ottawa, Illinois, then by wagon to the homes of their friends, the Vernons and the Bullards, twenty-five miles north, in what is today called Millbrook, Illinois. Millbrook is about 50 miles southwest of Chicago.

In 1838 today's Millbrook was called Camden, since many of its earlier settlers, among them the Vernons and Bullards, had emigrated from Camden, South Carolina. The Blandings arrived on June 25, 1838. They stayed with the Vernons and Bullards until August 8, when they returned home through the Great Lakes.

William Vernon and Royal Bullard were brothers-in-law. Both had married daughters of James Syng Murray, while living in Camden. Blanding and Murray were also brothers-in-law, having married sisters (Blanding's first wife). Hence Blanding and the Vernons/Bullards were also related by marriage.

The Journal

"Scraps" is a leather-bound book, approximately 5¼ × 7½ in. It contains 253 pages of handwritten text, plus around two dozen pages of unnumbered sketches. The handwriting is clearly that of two different people.

On Friday, July 10, 1838, while staying at William Vernon's [whose land abutted the Fox River], he recorded: "This morning Mr. Rogers brought me a turtle (Emys)—I think it new—saw the same high up on the Mississippi; perhaps as far as Lake Pippin [sic], or even higher up, but was not able to obtain one. It is a new one, I have no doubt—the eye black & yellow—very bright and shining."

Bull. Chicago Herp. Soc. 38(2):31, 2003

Crocodilians Have the Ability to Swallow Prey Underwater

John Brueggen, General Curator
St. Augustine Alligator Farm
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The palatal valve, in the back of a crocodilian's mouth, is a unique adaptation that seals the throat off from both air and water. With this valve shut a crocodilian can grasp food underwater and not have the water flood past into the esophagus or glottis. Essentially the inside of a crocodilian's mouth is outside its body. Crocodilians obviously prefer to keep this palatal valve closed while submerged, and come to the surface to swallow their prey. It is often assumed that crocodilians are unable to swallow food underwater, because of the overwhelming flood of water that would flow into their body. However, we have witnessed three species of crocodilian swallowing their food underwater. The first is a female freshwater crocodile, *Crocodylus johnsoni*, housed alone. On several occasions she has picked up pieces of meat from the bottom of the pool and proceeded to eat them without surfacing.

The second observation is of a female saltwater crocodile, *Crocodylus porosus*, housed with its mate. This female swallows both above the water and below, seeming not to have any preference for one over the other.

The most convincing observation has been a female false gavial, *Tomistoma schlegelii*. She is currently housed in a large exhibit with another female and a male. This exhibit affords visitors a complete underwater view of the entire pool though four glass panels. Soon after moving the female to this exhibit, I witnessed her taking a piece of meat to the bottom of the pool and holding it. After about five minutes, she very deliberately partially opened her mouth, then opened her palatal valve, and quickly moved her head forward and swallowed the meat. She remained in a resting position on the bottom of the pool for another ten minutes. Since she had recently come to us from Audubon Zoo, I called the reptile staff there and asked if they had witnessed this behavior. They said that they had. Apparently the male *Tomistoma* at this facility was in the habit of stealing her food if she surfaced with it. I have witnessed her swallowing underwater on one other occasion. I believe the behavior is being extinguished by our training efforts, as our male does not have an opportunity to steal meat from the females.

I reluctantly included this subject in my talk at the 2002 Crocodilian Specialist Group (CSG) working meeting. I was just sure that the crocodilian experts from around the world were going to say that this was a very well known fact. But the only reference I found (Carpenter, 1928) is little more than guesswork on the part of the observer. Many CSG members came to me after the meeting and thanked me for mentioning this, as they too felt they had witnessed this behavior. Only one person said that they had actual video footage of a crocodilian swallowing underwater, but apparently it does happen with some frequency.

Literature Cited

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Bull. Chicago Herp. Soc. 38(2):32, 2003

Observations on Giant Garter Snakes (*Thamnophis gigas*) in the Southern San Joaquin Valley, California

Sean McKeown*

George Horace Hanley
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In the 1920s and early 1930s, the giant garter snake (*Thamnophis gigas*) was the most common snake found along the Kern River in and around Bakersfield, California, a city located in the southern part of the Great Central Valley of California, commonly referred to today as the San Joaquin Valley.

When one of us (Hanley) was a student at Franklin Elementary School in Kern County Union High School District, and later while at Emerson Junior High and Kern County Union High School, he and his classmate Arthur Cohen would search for giant garter snakes and other reptiles and amphibians near the Kern River. The first one they ever observed was at the age of five—still in kindergarten—while playing in Jastro Park.

In the 1920s and 1930s, the giant garter snake occurred in the southern San Joaquin Valley, virtually anywhere water existed year-round. Hanley lived on "B" Street in Bakersfield, and a drainage ditch on "A" Street had a population of these snakes. The ditch extended from the firehouse on California Avenue, mostly underground for several blocks, and out to the Kern River.

The nearby Kern River would flood in the spring, usually in April. The amount of melting snow runoff from the southern Sierra Nevada Mountains was tremendous. Buena Vista Lake in the lower west end of the valley would fill up on an 18- to 20-year cycle. Red-legged frogs (*Rana aurora*) were still incredibly abundant then. After the flood cycle, there would be a drought and sometimes the lake would dry up entirely.

The giant garter snakes were found in the Kern River itself as well as in irrigation canals. They were present in the area extending 13 miles east of Bakersfield to the Kern River Canyon. Their habitat required foliage, bushes and tules to provide the necessary cover along the river and its run-off areas. After a rain, they were frequently found in alfalfa fields and blackberries bushes which the local Chinese had planted next to the Kern River. During a flood, thousands of fish, such as carp and large minnows, would flop around in the water, and the snakes would remain there to gorge themselves. These heavy, thick-bodied nonvenomous snakes had an immense girth when full.

The thick-bodied giant garter snakes were very plain in coloration in this region. Typically, they were dirt-colored, with faint yellow or gray-yellow under the head, and gray-colored with no regular patterns on the dorsal surface. When dry, the markings were faint but when the snake was wet, the markings were more distinct. The snake had keeled scales, which helped it to blend in with the soil.

While growing up in Bakersfield, George Hanley had always wanted to measure a giant garter snake, but never had the opportunity to do so until finally, in the spring of 1941, when he was a 27-year-old science teacher, he observed a freshly killed DOR (dead-on-road) adult *T. gigas* close to the end of Bernard Street, near a fenced-off canal and cattle pasture in west Bakersfield. The 5′10″ tall Hanley held the dead garter snake up by the tail until the tip of its head touched the ground. The tail of the snake extended up to his eyebrows, making it approximately 5′7″ in total length. It was a good-sized snake, but not the largest he had ever seen.

Due to its isolated location, most people were unaware that giant garter snakes were still present in this area since, by the 1940s, their population had decreased dramatically. People frequently killed giant garter snakes at that time because they were known to have a nasty disposition and were quick to bite. It was also generally believed that, because the snakes ate so many fish, they were a threat to the interests of fishermen. It was this attitude, which was largely responsible for the extinction of the giant garter snake in the southern San Joaquin Valley during the 1940s and '50s.

After the Kern River was dammed in 1952, the California Department of Fish and Game sprayed rotenone on the river below the dam to get rid of nongame fish and restock with trout and bass. California Fish and Game also introduced beaver to the San Joaquin Valley in 1950, which then proceeded to take down many of the trees along the Kern River, destroying the vegetation so necessary to this species' habitat. These factors further contributed to eventual disappearance of the giant garter snake in the southern San Joaquin Valley.

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* Deceased. The Editor thanks Wendy McKeown for sending us this article, which Sean, always a great friend of the CHS, was working on at the time of his death.

Bull. Chicago Herp. Soc. 38(2):33-36, 2003

HerPET-POURRI

by Ellin Beltz

Where we left off last month, Ken and I had seen no live herps in Western Australia. When I typed my column in Hobart's caravan I wished I had a better species list to share. "Be careful what you ask for—you might just get it," my grandmother used to say, and the rest of the trip sure was like that.

The very day I sent my column electronically to Chicago, we saw a carpet python slithering rapidly across a blacktop trail in a dune shrub habitat restoration area. Everybody usually drives around it and parks at either end. There were lots of small lizards at this and every other beach in Western Australia—probably eating the millions of flies and small bugs.

Even on this day of cloudy skies, high winds and waves with dozens of surfers in wet suits waiting at the mouth of the Margaret River for that perfect curl, snakes and lizards were about. The shear heat of the land keeps them active and they don't seem to need as much sun heat as they do up north. Perhaps higher temperatures in dinosaur times would have permitted this type of activity in cold-blooded creatures, too. Every animal we saw on the rest of the trip moved faster than the animals we are accustomed to in the U.S. I wondered if it was being on the menu for 40,000 years making all the critters speedy or just the heat.

The next morning after we saw a small dugite snake [*Pseudonaja affinis*] sunning itself on some builders blocks and then we headed away from Margaret River towards the town of Nannup, photographing another flattened snake. We were pleasantly surprised to find this CALM office (Land Management Agency of Western Australia) open and full of information and an outgoing and knowledgeable officer. We checked into a motel later in Pemberton and watched New Years fireworks both on the television from Sydney and out the door over the town.

Then we drove through the karri forest. Karris are giant eucalyptus trees with different colors of bark in strips (sometimes spirals) that are said to be the third tallest species of tree on earth. As there are specimens of both of the taller ones in our neighbor's yard here in Ferndale, we found the karris big, but not amazingly tall. What I found fascinating was in the recently burned areas, the karris dropped their stringy bark and leaf ash in little cones around their bases. You could just imagine the fire running up the tree and the ash falling directly down.

The center of Australia's giant trees area is the town of Walpole. I liked Walpole. The people there were really trying to be helpful and outgoing. They also had great cottage industries and good food. We bought our tickets to the Tree-Top Walk and drove there still not really knowing what to expect.

The Tree-Top Walk was amazing. It deserves its press in that they have very carefully built a boardwalk through some very ancient trees and a hanging walkway through another grove of the very tallest. The walkway is suspended from pillars, so the footprint on the forest is very small. The suspended walkway goes about 20 stories up in the air and swings a little. The tread of the walkway is welded metal screen so you can see down as well as over the top and out both sides. We saw more tourists from other places at the TTW than we ever did again in Australia. And more minicams, digicams, flashicams and pose-please-picture in various languages than I have seen in a long time.

For most people I think the walk was more an endurance thing, especially for those afraid of heights. They even had "I survived the TTW" tee shirts and certificates in the gift shop. But for the more eco-inclined, and willing to stand aside and let the tourists fly past, it was a view into the tops of the trees in a fascinating grove on the edge of a giant valley.

We then drove through the town of Denmark and to the seaside town of Albany. We found a darling Best Western motel which had the standard Australian room furniture of one or two beds, several small tables, a dresser, an iron and ironing board, a hot-water kettle, a mini refrigerator (stocked with milk for your tea of course) and a passthrough door for breakfast. We never used the last, but you could see other people having their breakfast plates delivered at precisely the time they were ordered. Some parts of Australia are so British and other parts are so not. Albany is almost trying to be part of the U.S. They have a K-mart and a Target and several one-hour photos. But get me out of town, always into the bush! We drove to two rock features nearby.

This coast of Australia is where the split occurred between this continent and Antarctica. What got left on the Australian side are high rock walls. In these huge walls of granite, gneiss and quartz veining. Being granitic, it breaks in large blocks which then weather down with rounded edges. So we had seen lots of "elephant rocks" and one cliff at Point Leeuwin that almost looked like columnar granite, but wasn't quite so regular.

What we saw now was truly amazing. The Gap is a natural joint in the rock that is about 30 stories high. You walk across bare rock to get to a concrete platform with a waist-high railing. Each wave, 30 stories down, crashes into the rock wall and a fine plume of water and spray gets sent high up the crack, straight towards the viewing platform and the approach walkway. There is the usual understated sign about your survival being up to you after a long list of ways you could hurt yourself here. Of course we saw people trying all the things on the list.

After the Gap, we went to the Natural Bridge which is just enormous. You could park four or five 18-wheel trucks end to end on the unsupported span of fractured gneiss which overhangs an airspace in which you could put one or two of those same trucks standing on end. Under the bridge is a washed rock platform. We were there at low tide, so we could see the rocks; if we'd been later, all that would have been below it would have been crashing surf. A little further along are some blowholes. This is really reassuring for a geologist. You are standing on some sort of a formation which has a direct connection to the sea. Every once in a while, a big wave will send spray up 20 or 30 stories. Sometimes rocks pop out, but

they mostly looked like fractured pieces of the formation, so I suspect they are little bits which have fallen off the walls of the blowholes and are not being sent up from the ocean below. It was cold and windy, but the surf wasn't cooperating. We heard some noises and rumblings and went back toward town.

On the road we found an amazing walkthrough bird aviary. For a minimal entry fee, they gave us flowers of one of the local plants and sent us through double screened doors to commingle with cockatoos, parrots, galahs, cockatiels, budgies, zebra finches, and a bunch of other birds I hesitate to even guess what they were. Colors included the whole spectrum from delicate blues through vibrant reds on the King Parrot.

The next day we left Albany by way of the back roads. I drove some single track and some gravel and we hit some towns that were far off the beaten track and not even in the Lonely Planet guide we'd hauled all the way from home. We saw some "truck trains" and ranches and some more granitic mountains in the distance. We stopped at a salt lake—perhaps one of those we'd seen on the airplane coming in. Due to cutting down the forest, the landscape lost a large amount of evapotranspiration. The result has been a rise in the water table and the freeing of salt ions held for eons in the soils. Where all this salty water runs off, these huge salt lakes form. Now they're planting huge forests on the lakes in an effort to reverse this trend.

Just like in the U.S., the huge forests were all cut down in the early days of Euro-cultural habitation, which in this part of Earth is only about 1805 and onward. All the wood was shipped back to Europe in ships that brought people (mostly English "convicts") on the other leg. The wood was used to make wooden paving, curbing and sidewalks. The Australian who told me this was convinced that their wood was still in place. After two world wars, I'd be surprised if any wooden blocking survives, but I hadn't the heart to tell her.

Driving along for hours in this fascinating landscape, listening to Midnight Oil, we noticed we hadn't seen anything of the aboriginal people except one monument to an aboriginal who helped the white people settle Albany. There were no aboriginal parks or villages of even the most touristy type. None of their fabulous art was in the stores except the occasional "authentic" boomerang (made in China). The landscape needs burning to stay in good shape and it was fully inhabited when the whites arrived. So where were the original people? We hadn't seen any slums, but we hadn't seen any but one family group in Perth either.

Our rental car just rolled along amidst endless fields and vineyards. Houses, barns, windmills, fences flashed by with hedgerows of grass tree, bright yellow Christmas tree wattle and gray eucalypts with those glossopteris-like leaves waving as we flew by. We returned to Margaret River, got some great fish and chips, headed back to Hobart's caravan and got ready to go back to Perth the next morning.

We stopped near the town of Mandurah to see some of the oldest life forms on Earth: thrombolites. Created by a similar process to stromatolites, these pillows of colonial bacteria live from the high tide zone all the way to the offshore zone in Lake Clifton, which is a long narrow lake bounded by sand dunes and having a calcareous input from water percolating through the shell-rich sands. The water was lapping back and forth over these ancient things, known only from the Bahamas and this one strip of Australia's western coast. Their ancestors made our air and only these few were able to survive in it. Our friend Hobart said they even made him feel young and we went off to town.

We got Hobart to the airport the next morning, then drove with Geoff and Maureen to the Pinaroo Cemetery to photograph kangaroos, which just sort of hang around like Canadian geese at the tollway pond. Then we went to Freemantle where I met an aboriginal man in full feathers and string (and not much else). He said he was playing the Joker and when I joked him back, he enjoyed it very much. He asked what I do and I told him about teaching Environmental Ethics last year. Our book had a chapter for each continent's ethics. This elderly man in a tassel and feathers screwed up his eyes and said, "I betcha the European chapter was the shortest!" And when I stopped laughing, I realized he was right. But he had vanished into the crowd to joke with someone else in this essentially whites-only shopping/dining hotspot with the young bucks cruising by in gleaming muscle cars.

The next day we went to the Armadale Reptile Park where we saw heaps of reptiles, a croc, some turtles, frogs and huge 12-inch long bats. They also had walk-through aviaries with smaller kingfishers, but no kookaburras yet—we'd only heard them. We heard several great reptile-rescue stories from the staff. Many were familiar, but one new one was a side splitter.

Nature Center Lady (NCL): Madam, please describe this snake.
Hysterical Woman (HW): It's huge and it's got four legs . . . .
NCL: Ma'am, snakes don't have legs.
HW: Yes they do, they just fall off when they get older.

The next day we went to the AQWA Aquarium where there is an underwater tunnel and a moving walkway so you just stand still and the sea life swims over your head. We saw sharks, rays, a sea turtle and innumerable fish. They also had sea dragons both the plain ones and the leafy variety. If you've never seen a leafy sea dragon, log on and search out a picture [or better yet, visit the Shedd Aquarium]. These things are poetry in slow motion. Absolutely fascinating, and the AQWA worker pointed out that they wash up along the beach all along this part of the Perth coast. AQWA also had a petting pool where we touched a soft velvety ray.

The day after that we went to the Western Australia Museum where we were bored in the rocks and fossils (very generic and nothing really of local material) and then fascinated by the "Stolen Generations" cultural exhibit. If you get the opportunity to see an Australian movie called "Rabbit Proof Fence," do see it—it's all true.

Our next whole day was spent flying from Perth to Brisbane where we were met by our friend Andrea. That was particularly good as the rental agency we'd booked our car from was not at the airport, a fact they'd neglected to mention to our travel agent. She drove and we talked for the next 45 minutes

and ended up at her fairy tale beautiful seaside palace south of Brisbane along the coast dotted with offshore sand islands.

The next few days are full of expeditions. Andrea has been around the world a couple of times and wants to see everything everywhere on tours, so the first few days were a whirl. First we went to the offshore islands on a wonderful ferry that reminded me of a WWII landing craft complete with drop down front gate. On the island we saw flattened cane toads and sulfur-crested cockatoos. After that we went to a nature preserve and saw a wild koala sacked out in a paperbark eucalyptus tree.

This is the place to point out that in flying across Australia, we covered as much landscape as flying from San Francisco to New York. Where the west side was arid and hot, the eastern side is a tropical rain forest edged by blinding white beaches, fringed in glittering high-rises catering to a global holiday crowd. One town reminded me a lot of Miami Beach plus Las Vegas, lots of sand and flashing lights. But the back theme is Asian, many of the shops have signs in Japanese and Korean and the shopping seems oriented (pardon the pun) to this market.

Unlike the west, where everybody ignored the wildlife, here a natural area had wallabies just hanging around the parking lots where children stopped to feed them highly nutritious wallaby chow like Vitamin 12 Bread. We also saw a lace monitor flashing around in the trees and went looking for platypus, but the pools that would have supported them were dry. All of Australia is having a terrible drought and even this wet eastern shore is no exception.

The town and place known as Mount Tambourine is worth a visit if you are ever near Brisbane. It is a charming mountain-top town full of art studios and galleries. The view from the top is worth the drive alone, but it is substantially cooler on top of the hill and we got a light dusting of rain, too.

Along with all the day travel, we were renting videos made in Australia and watching them at night. Highly recommended are: *Priscilla, Queen of the Desert*; *Babe*; *The Dish*; *The Castle*; *Rabbit-Proof Fence*; *Muriel's Wedding* and all three Mad Max movies. Obviously, we did not even try to watch all of these on one night!

The next day we went to downtown Brisbane for the Sunday market on the Riverwalk. We also saw the dinosaurs at the Queensland Museum. There were water dragons basking on the rain forest boardwalk and humans basking along a man-made beach perched high on the shoreline above the river. All this backed up by tall high-rises of this eastern commercial center. Otherwise, this too was rather like the U.S. Lots of three- or four-lane highways, public transport up one side, multiple person commuting lanes and so on. But they also have speedy water taxis and ferries to connect up with all the shoreline housing and islands.

The next day Andrea drove us two hours north to Steve Irwin's Australia Zoo in Beerwah. Everyone will tell you how Steve and Teri live very simply and the whole thing is run for the purposes of conservation. They buy habitat. I enjoyed the whole thing very much but wonder how it is that the map that would show you how to get there is the only chunk missing in the "About Brisbane" handout that is everywhere in the region. It mentions the Zoo, but one map stops short and the other one picks up after it. So even with a relatively native Queenslander driving, we got lost.

When we did get there, we parked somewhere in the next county and walked in feeling a bit like we'd arrived at 6-Flags, but all the staff was wearing Steve: khaki top and shorts, elastic sided or work boots and cap or visor. What an outfit! It felt like Jurassic Park for reptiles and other Australian animals. When we first got there the crowds were at the photo with a giant snake. Then they arrived around the croc pit for the feeding show which was led by Teri Irwin. Then everyone headed off to the Feeding Frenzy food court for lunch. Then to the other croc pit for some singing and another croc feeding. Then to the reptiles for the feeding. Then the American alligators. Those are really near the exit at the gift shop. So most of the crowd left.

We saw a couple of the shows, but went the other way from the crowds, walking through the open kangaroo habitats where you can walk right up and feed them special kangaroo chow or just take lots of pictures. We walked through the wetland bird habitat and the netted bird enclosure. Got to the raptors in time to hear the usual raptor rehab stories, just with alien species and arrived at snakes in time for venomous snake feedings.

The snakes included the king brown snake, black tiger snake, eastern tiger snake, taipan, green python, carpet python, red-bellied black snake and more. Every enclosure was clean, the snake backgrounds were habitat paintings and the foregrounds included things very similar to those we had just seen when we were photographing this stuff squished and alive in Western Australia.

We also saw wombats, Tasmanian devils, dingos, koalas, a pond full of turtles that just looked for all the world like small snappers, but were sidenecks, and more lizards, monitors and otters. We were some of the last people out, through the gift shop and into the land beyond Steve. Of the whole experience, I was surprised only by the gift shop. With all the emphasis on conservation, there was very little factual information in the shop. It was mostly souvenirs and cult-of-Steve stuff. I almost expected to see a box that said, "Now! Dress your ankle biter as mini-Steve! Everything you need to feed Junior to a croc!"

Actually and rather surprisingly, there were more adults that children at the Zoo and it was school holidays. The other place where that ratio was surprising was at the "Hyperdome," the local supermall. It was almost all teens and up. They had the ubiquitous K-mart and Woolworths (here a grocery store) and a bunch of smaller stores. The whole feel was so very mall. There was nothing of Australia except the ubiquitous "Made in Australia" tags on the usual household stuff, just like what we get at home in the U.S., except all the screws are metric.

We went back to Andrea's to make dinner. Her daughter went outside to feed the fish and discovered a cane toad in the ornamental pond next to the swimming pool. Ken immediately went out and caught it and because it was nearly dark we put it in a bucket overnight so we could take photos of it in the

morning. When we got a good look at it in the morning, we noticed it was deformed, one arm stuck out at an odd angle and it was missing a toe and a half.

So photos and then a humane death for this other convict, carried here against its will and only doing its toad thing of spread and conquer. Unfortunately, the Australian wildlife can't handle *Bufo*'s toxins and so are diminishing or vanishing as the toad spreads. We were rather surprised that there were no organized efforts afoot to catch them or try to stop their spread across the continent. I guess I shouldn't be surprised. The only placental mammal 40,000 years ago may have been the bats, then humans and early dogs (dingos). Since then a whole host of plants and animals and several more human cultural waves have followed. Each wins a few, loses a few. Some, like humans and toads, spread everywhere. Others, like the platypus which we saw at Brisbane Forest the last day we were in Australia, are pushed so far toward extinction that you have to call a nature center to find out when and where you can go platypus watching.

The other animal we finally got a great look at in our last days in Australia was the kookaburra. As soon as they were sure we were leaving, they showed up and sang. Also that last night, by the light of the full moon, the black and shiny 12-inch bats went swooping by the hundreds then the thousands, across the cliff that separated Andrea's patio from the bay and the smoke and glow of a bush fire burning its way across a natural area on one of the offshore islands. These are fruit bats, they were coming for the Macquarie Island figs from the neighbors' giant tree.

Frogs croaked and the winds from Cyclone Zoe had finally calmed down enough to sit outside without a sandblasting. The next day (days?) we spent on airplanes eating tiny meals at inconvenient intervals and trying to stay patient while sharing a metal tube with 365 other people none of whom will talk to you except the help, maybe.

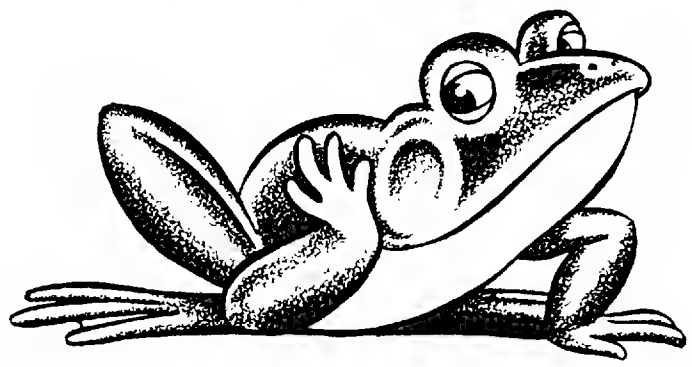
We arrived in Los Angeles and marveled at the instant diversity. The happy Hispanic fellow driving the link bus around from terminal to terminal. The melting pot of security screeners, flight crews, shop help. We hadn't realized just how white Australia was until we arrived in LA. San Francisco was fun too, although here the rainbow nation was an antiwar protest that the papers reported was 65,000 strong. All I can tell you is it took two hours to do 15 minutes of driving and by the time we got home it was nearly dark and we were exhausted after 23 body hours of travel.

And then the next day we got our mail! A whole month, including Christmas and clippings for my March column from wonderful contributors. As always, if you see a great herp article (or conservation in general), please send it to: Ellin Beltz, POB 934, Ferndale, CA 95536. Letters only to my E-mail, please ebeltz@ebeltz.net. Photos for the Australia trip are available on Ken's website http://kmier.net (click on Australia). Read me next month when we return to our usual format!

Bull. Chicago Herp. Soc. 38(2):36, 2003

The Tympanum

I am writing to thank you for your recent gift to support the work of the Declining Amphibian Populations Task Force (DAPTF), a program of The World Conservation Union's (IUCN) Species Survival Commission. The DAPTF relies heavily on individual donations to fund its scientific studies into the extent and causes of amphibian declines throughout the world, and your gift will provide direct support for these and related activities.



You will receive a separate letter of acknowledgment from Brookfield Zoo/Chicago Zoological Society, with which DAPTF entered into a financial agreement in fall 2000. This agreement allows donations to the Task Force to qualify as contributions to a non-profit organization for U.S. federal income tax purposes, and at minimal cost. We thank Brookfield Zoo, as well as organizations such as Conservation International and the Detroit Zoological Institute, for their ongoing commitment to furthering the DAPTF and its mission. I also would like to welcome **Peace Frogs** <http://www.peacefrogs.com/>, an internet-based clothing company, as a new sponsor of *Froglog*, DAPTF's newsletter.

I encourage anyone who would like more information regarding the Task Force or its activities to contact Tim Halliday, John Wilkinson, or myself. Thank you again for your support . . . . **James Hanken, Chair, Board of Directors, Declining Amphibian Populations Task Force**

The Chicago Zoological Society . . . acknowledges receipt of $200.00 from the Chicago Herpetological Society on December 13, 2002, designated for financial support of the Declining Amphibian Populations Task Force.

I join Jim Hanken in personal thanks for your support of DAPTF. Although much has been learned since the start of DAPTF, there is still work to be done to help specify the appropriate conservation action responses on the basis of as much pertinent information as we can assemble. . . . **George B. Rabb, Director, Brookfield Zoo, and President, Chicago Zoological Society**

Unofficial Minutes of the CHS Board Meeting, January 17, 2003

Lori King called the meeting to order at 7:33 P.M. Board members Darin Croft and Jack Schoenfelder were absent.

Officers' Reports

Recording Secretary: Zoe Magierek read the minutes she took at the December board meeting. Corrections were made and the minutes were accepted.

Treasurer: Jim Hoffman presented the Treasurer's report in a new format. Mike Dloogatch questioned why Adoptions did not appear as a restricted fund on the balance sheet, as did Grants and Massasaugas. Jim Hoffman said that in 2002 there were more adoption expenses than donations, so the fund balance at the end of the year was zero and hence did not appear. In response to a question about reimbursing board members for expenses on behalf of the CHS, it was reaffirmed that our policy is that unbudgeted expenses over $25 need board authorization. The 2003 budget is not yet complete. By the next board meeting Jim Hoffman will have prepared a tentative budget. Darin Croft has prepared a ReptileFest budget. Jim Hoffman proposed that we renew the domain name of the website starting in August for the next nine years, for about $100, so we can get a price break. Mike Dloogatch moved that we so renew the domain name and Jim Hoffman seconded. The motion carried unanimously. Jim Hoffman brought up mileage reimbursement for speakers. The consensus was to use the standard IRS rate of 36 cents per mile for 2003. Linda Malawy questioned some of the adoptions figures. Jim Hoffman will provide her with explanations.

Membership Secretary: Mike Dloogatch reported that there were 770 December *Bulletin*s mailed.

Corresponding Secretary: Erik Williams reported on his disposition of recent messages on our answering device.

Standing Committees

ReptileFest: Drain Croft was out of town. The first ReptileFest committee meeting will be 2/2/03 in Hyde Park. Steve Sullivan tried to get the Nature museum to participate and offered them a free table. Museum members will get a $1-off discount at te door. The last time we got them to participate was about 3 years ago when they were just setting up.

Grants: Mike Redmer said that 25 proposals have now been received, with 23 of them arriving between 12/25 and the 12/31 deadline. Letters of recommendation are still coming in late. The board allocated $2000 for the 2003 grants, and over $600 more was received in donations.

Shows: On 3/8/03 there will be a show at the Nature Museum and the Arlington Family Pet Fair is 3/14–16. Jenny Vollman wondered if she needed board approval to pay for the space at the Arlington show. Last year a lot of flyers were handed out and a photo booth and t-shirt sales could increase exposure and profit. A decision to do it again this year should be made. Rental of the space is $500 and it would be $50 for electricity. Jenny Vollman brought up the idea that virtually anything could be sold, and the show could be used to generate income. John Archer said that we did not lose money on the Navy Pier photo booth, were able to cover its expenses, yet not the whole expenses for the show. Jenny Vollman moved that the CHS pay for the Arlington booth rental. Joan Moore seconded. The motion carried unanimously.

Raffle: Jack Schoenfelder is able to bring enough stuff for the January raffle and Ron Humbert thinks he has enough for February. Then we will be down to next to nothing. Lori King said that she has some items that she could bring. Erik Williams will write donation solicitation letters next week. Someone needs to make a list of where donations are coming from. Ron Humbert said he gave a list to Bob Herman but it is not being announced. A list of the donors should be given to Mike Dloogatch to be put in the *Bulletin*.

Library: Steve Sullivan reported that the library was looking good and that maybe we should think about adding books, yet he is working on an inventory and does not want to add books until we see what we have. Tom Anton mentioned that it has been at least 5–8 years since we have bought new books. Linda Malawy brought up the idea of asking publishers for books, as donations. The idea of asking publishers for two copies of books, one for the reviewer and one for the library was also discussed.

Adoptions: Linda Malawy has been receiving calls again; for a while there were few. Linda mentioned wanting to know ahead of time if people were looking for specific animals so she could have some idea of potential homes. The gopher tortoise she had went to the DNR in South Carolina; she will submit the shipping expense later.

Conservation: Lori King has decided that there should be a standing conservation committee. She wants people to bring conservation contacts and issues to the board. She said that we would be the first herpetological society listed on the Cayman Island blue iguana conservation plan. Jim Hoffman wants the CHS to issue a check for any proceeds we raise, so we will be able to more formally track what we have done for these groups. Linda Malawy said that Lori King already gave the donations as if they came through the CHS, so the CHS could have some credit. She also wanted Lori's time and personal expenditure to be noted. Steve Sullivan commented that we were still within the 45-day comment period for Bush's new non-navigable wetlands policy. Mike Redmer does not see many changes in it that are different from the current laws. He said that Corps regulatory groups are different in different places, and the administration is trying to solidify rule-making among agencies. Steve Sullivan wants to see more wetland protection and sees a comment letter as a way to voice our opposition. Jim Hoffman wondered if the board needed to approve the comment letter. The answer was yes, but the next board meeting would be too late. Steve Sullivan proposed supporting wetland conservation whether navigable or not, and not necessarily proposing changes, but putting out voice on record. Steve Sullivan, Mike Redmer and Erik Williams will look into it further, and possibly draft a letter.

Ad Hoc Committees

Dangerous Animals Act: The committee is waiting to hear responses from other regional societies.

Awards: Lori King spoke to Greg Brim who said the awards were ready. Mike Dloogatch found the cost of $310 to be very high. Last year the awards were $275. Mike Redmer wondered if we needed to be spending $300 on awards at a time when we were losing money. Ron Humbert said that the outgoing president had always gotten a gavel, but that the other awards were developed during a time when CHS finances were more robust. Lori King thinks it is a nice thing to do and Greg Brim mentioned that our suppliers may be expensive and perhaps we could look elsewhere in the future. Mike Redmer brought up seeing if we have a member that could make them.

Trips: Steve Sullivan said we need to decide if we want to have Notebaert museum exposure to zoo trips. They are looking for alternative trips for members.

Salamander Safari: Linda Malawy brought up putting out a jar for donations for food and beverage. She also moved to spend $50 for snacks and beverage; the motion was seconded by Jenny Vollman and carried unanimously.

Reptile of the Month: In March it will be salamanders and in April, due to Bob Cullnan's suggestion, it will be horned and pyxie frogs.

Old Business

State Reptile and Amphibian: Ron Humbert said letters about the project will be sent to all state representatives, the IL Natural History Survey, The IL Audubon Society, The Chicago Park District, The Field Museum, The Grove, The IL State Museum and the IL State Library. Tom Anton mentioned Ryerson Conservation and Will County. Erik Williams will give Ron Humbert the name of the Chicago Public High Schools science curriculum director. The State Amphibian project works with the state curriculum. It can be used as a vehicle to express concern over wetland preservation and vanishing amphibians. Children will be doing projects about appropriate candidates.

Board of Directors Insurance: Facts and quotes are needed; we still do not have enough information.

New Business

Board members should check their contact information on the website and make sure it is correct. Erik Williams said that Paul Rodriguez proposed a link exchange between our website and that of the Nebraska Herpetological Society. It was decided to do so, and to ask Chris Lechowicz to make the changes. Linda Malawy mentioned seeing other websites solicit donations. She suggested that we have a Massassauga section on the website and ask for donations and sell T-shirts. Joan Moore mentioned organizing our links and seeing them as a reflection of the CHS. Perhaps Mike Redmer should look at submitted website material as publications secretary. At past meetings it was decided that Chris had carte blanche regarding the website. Jim Hoffman said that Chris did not critique he just posts what is given to him. Tom Anton said that Mike Redmer maintains contact with Chris and acts as a conduit between him and the board. We need things to replace outdated materials on the website. Joan Moore and Lori King thought that maybe Mike Redmer should take a look more often at the website. Jim Hoffman suggested that a board member be involved in putting things up on the website, perhaps Mike Redmer or Tom Anton. Ron Humbert said the situation should remain as is, that Chris would not abuse the privilege.

Round Table

Bob Cullnan wondered about the Sergeant-at-Arms keeping a log of attendance at general meetings as is specified in the bylaws. Joan Moore said that when she ran for Sergeant-at-Arms she suggested an amendment to do a headcount instead of a record or the name of every person that attends. Jenny Vollman agreed. Joan Moore suggested that board members wear nametags at every general meeting.

The meeting was adjourned at 9:50 P.M.

Respectfully submitted by Recording Secretary Zoe Magierek

Chicago Herpetological Society
Income Statement: January 1 – December 31, 2002

Income		Expense	
Adoptions	$ 565	Adoptions	$ 1,626
Grants	642	Grants	3,000
Massasauga Shirts	3,344	Massasauga Shirts	1,988
Membership Dues	17,546	Addressing/Mailing Service	2,278
Contributions	537	Advertising	6,197
ReptileFest Admissions	15,570	Awards	274
Amazon.com	122	Bank Fees	80
Bulletin Ads	275	Donations	200
Bulletin Back Issues	8	Equipment Rental	370
Foreign Postage	132	Liability Insurance	1,340
Interest	186	Licenses and Permits	18
Photo Booths	1,232	Meals	600
Raffle	1,230	Office Supplies	1,379
Sales	1,260	Photos	886
Table Sales	990	Postage	2,361
Tattoos	304	Printing/Duplicating	15,619
Zoo Trip	1,575	Rent	6,700
		Speaker Reimbursement	1,015
		Telephone	546
		Zoo Trip	1,649
		Miscellaneous	1,663
Total Income	$45,518	Total Expense	$49,789

Net Income ($4,271)

Chicago Herpetological Society
Balance Sheet
December 31, 2002

Assets	
Harris Checking	$ 6,343
Harris Money Market	30,097
Total Assets	$36,440
Equity	
Restricted – Grants	$ 642
Restricted – Massasauga	1,356
Retained Earnings	38,713
Net Income	(4,271)
Total Equity	$36,440

Herpetology 2003

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

ECOLOGY OF THE TWIN-SPOTTED RATTLESNAKE

D. B. Prival et al. [2002, J. Herpetology 36(4):598-607] note that the twin-spotted rattlesnake (*Crotalus pricei*) is a small-bodied pitviper that has received little attention in the literature to date. The species reaches the northern limit of its range in southeastern Arizona, where it inhabits higher elevations than any of the state's 10 other rattlesnake species. During 1997–2000, the authors captured, measured, and marked 127 *C. pricei* in Arizona's Chiricahua Mountains between 2530 and 2900 m elevation. They also used radiotelemetry to track the movements of 16 *C. pricei* in the study area during 1997–1998. Mean (± SE) snout–vent length of *C. pricei* was 387.8 ± 8.3 mm (range = 168–572), and mean mass was 53.5 ± 3.3 g (range = 3.6–188.5). Based on fecal analyses, lizards constituted the bulk of prey (74%), but the diet of *C. pricei* also included mammals, birds, and a conspecific. Mating was concentrated in August and early September and parturition took place during late July and August. Mean number of embryos was 3.94 ± 0.34 (range = 1–6) and female reproduction appeared biennial or less frequent. Based on shed and growth rates, female *C. pricei* develop embryos at 4–5 years of age. Gravid females maintained warmer body temperatures relative to substrate temperature than nongravid females or males, presumably by spending more time basking than other snakes. Radiotelemetry revealed that movement patterns varied from year to year, as males moved over six times farther per week during the 1998 monsoon season (July to September) than during the 1997 monsoon season. Additionally, use of talus slopes by males decreased during 1998. During dry years, such as 1998, males may be forced off talus into cooler microclimates where resources are less concentrated than on talus.

A NEW SALAMANDER FROM CALIFORNIA

D. B. Wake et al. [2002, Copeia (4):1016-1028] report that populations of robust salamanders belonging to the plethodontid salamander genus *Batrachoseps* (subgenus *Plethopsis*) from the southern Sierra Nevada and adjacent regions represent a previously unknown species here described as *Batrachoseps robustus*. The new species is robust, with a short trunk (17–18 trunk vertebrae) and well-developed limbs. It differs from its close geographic neighbor, *Batrachoseps campi*, in lacking patches of dorsal silvery iridophores and in having (typically) a lightly pigmented dorsal stripe, and from *Batrachoseps wrighti* in being more robust, having more trunk vertebrae, and in lacking conspicuous white spots ventrally. This species is widely distributed on the semiarid Kern Plateau of the southeastern Sierra Nevada and extends along the east slopes of the mountains into the lower Owens Valley; it also is found to the south in the isolated Scodie Mountains. It occurs at high elevations, from 1615 to 2800 m, in areas of low rainfall and high summer temperatures.

LIZARD REPRODUCTIVE MEDICINE AND SURGERY

R. S. Funk [2002, Vet. Clin. Exot. Anim. 5:579-613] reviews basic lizard biology for veterinarians, with the emphasis on treating lizard patients with reproductive problems. Topics covered include: What are lizards?; Modes of reproduction; Sexing lizards; Lizard husbandry; Femoral pores and pheromones; Longevity; Age at sexual maturity; Physiological basis of sexual behavior; Parthenogenesis; Eggs and embryos; Incubation of eggs; and Reproductive surgery.

SAMPLING EELS FROM SEA KRAITS

R. N. Reed et al. [2002, Copeia (4):1098-1101] report that collecting eels of the families Muraenidae and Congridae is often hampered by logistical and procedural difficulties. Sea kraits of the genus *Laticauda* may be useful bioassays for moray and conger eels in the western Pacific Ocean. Some widely distributed species of *Laticauda* appear to prey exclusively on eels, and these eels are readily palpated from snakes after they return to land to digest their prey. The authors removed 79 eels from 276 snakes on the island of Efate, Republic of Vanuatu, during November and December of 2000. Species diversity inferred from these eels was markedly different from the diversity inferred from eels from Vanuatu deposited in the Australian Museum, perhaps reflecting differential abilities of snakes and humans to capture certain eel species. This bioassay technique is inexpensive and logistically simple and may prove complementary to more traditional collecting methods.

MORELET'S CROCODILE IN BELIZE

J. A. Dever et al. [2002, Copeia (4):1078-1091], prompted by lack of information on natural history and ecology of the endangered Morelet's crocodile (*Crocodylus moreletii*), have begun a baseline study of the population genetics for this species. Nine microsatellite loci have been used to estimate genetic structure within and gene flow patterns among crocodiles (using a recently described maximum likelihood approach) from seven localities in northcentral Belize. Individuals from the seven localities grouped into four apparent populations. Within localities, a high degree of genetic heterogeneity was observed. Among all localities, some subdivision was present ($F_{ST} = 0.062$; $R_{ST} = 0.100$). Furthermore, among the apparent populations, the authors found a significant correlation between geographic distance and genetic subdivision. These findings suggest a relatively high level of migration among populations ($Nm = 5.15$) and are consistent with an isolation-by-distance model of gene flow. Two contiguous subpopulations in particular, New River and New River Lagoon, may form an important source for genetic variation for smaller populations throughout the region. These data will allow us to test hypotheses of relatedness among *C. moreletii* for other drainages in Belize and will be useful in optimizing future management programs for *C. moreletii*.

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For sale: natural history books. *A Handbook of the Lizards of Western Australia* by L. Glauert, 1961, 100 pp., 9 figs., softbound, $18; *A Handbook of the Snakes of Western Australia* by L. Glauert, 1967, 71 pp., 29 figs., softbound, $18; *The Snakes of Australia* by J. R. Kinghorn, 1964 revised ed., 197 pp., many color drawings, DJ, hardbound, $20; *Reptiles and Amphibians of Australia* by Harold Cogger, 4th ed. (1986), 688 pp., over 880 photos (230 in color), DJ, hardbound, $40; *Snakes of Rhodesia* by Broadley and Cock, 1975, 152 pp., 64 color plates, 11 figs., softbound, $30; *Raymond L. Ditmars—His Exciting Career with Reptiles, Animals, and Insects* by L. N. Wood, 1951 (1944), 255 pp., DJ slightly torn, $20. All books in excellent condition except as noted. Postage paid for orders $25 and over, $2.50 for orders under $25. William R. Turner, 6014 Blue Ridge Drive, Apt. A, Highlands Ranch, CO 80130; (720) 344-6197; E-mail: turnerbmrk@prodigy.net.

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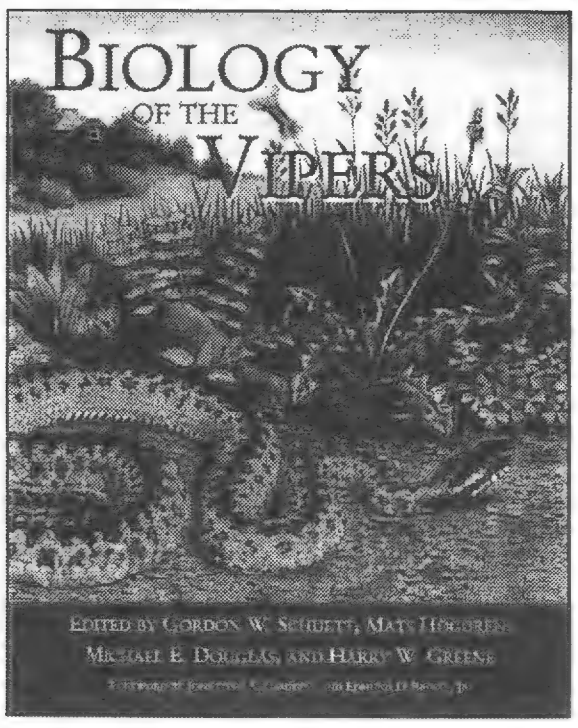

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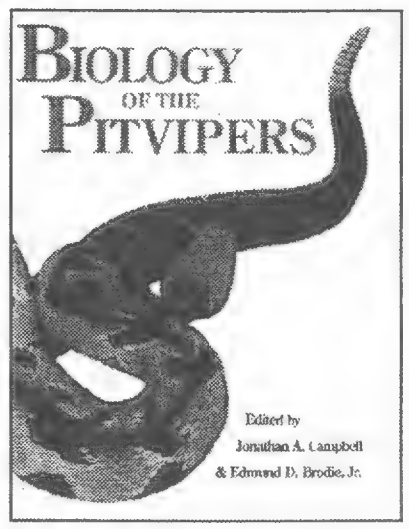

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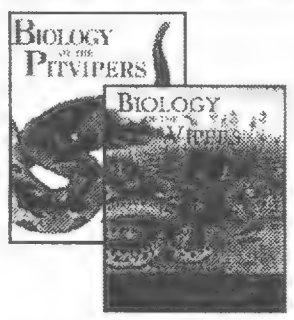

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2003 CHS GRANT RECIPIENTS

The CHS Grants Committee has chosen the CHS grant recipients for 2003. The committee consisted of Michael Dloogatch, Gery Herrmann, DVM, Lori King and Michael Redmer. This year we received 27 applications, as usual far exceeding the number of grants that could be awarded based on available funds. After a difficult decision process, eight grants were awarded, in varying amounts, as follows:

- Rebecca A. Christoffel, Department of Fisheries and Wildlife, Michigan State University. "Integrating Human Dimensions in Rare Reptile Conservation Efforts," $500.
- Aaron Rundus, Animal Behavior Graduate Group, University of California, Davis. "Infrared Radiation as a New Modality of Communication between Northern Pacific Rattlesnakes (*Crotalus viridis oreganus*) and California Ground Squirrels (*Spermophilus beecheyi*)," $500.
- Theresa L. Wusterbarth, Department of Biological Sciences, Northern Illinois University. "Mating Strategies and Multiple Paternity in the Plains Garter Snake (*Thamnophis radix*)," $500.
- Kelly A. Bradley, Reptile Department, Dallas Zoo. "Post-release Behavior and Survival Rate of Headstarted Anegada Iguanas (*Cyclura pinguis*) of Different Age-classes," $250.
- Roberto Brenes, Department of Biology, The University of Texas at Tyler. "Ecology of the Gulf Coast Waterdog (*Necturus beyeri*) in East Texas," $250.
- Joshua M. Kapfer, Department of Biological Sciences, University of Wisconsin–Milwaukee. "Habitat Selection and the Effects of Vegetative Succession and Prairie Management on Bullsnake (*Pituophis catenifer sayi*) Population Biology in the Upper Midwest," $250.
- Jason Ortega, Undergraduate, Cornell University. "Envenoming, Digestion and Nutrition in Captive Pitvipers," $250.
- Kevin G. Smith, Department of Ecology and Evolutionary Biology, The University of Tennessee. "Comparative Toxicity of Native and Introduced Populations of the Cane Toad, *Bufo marinus*," $250.

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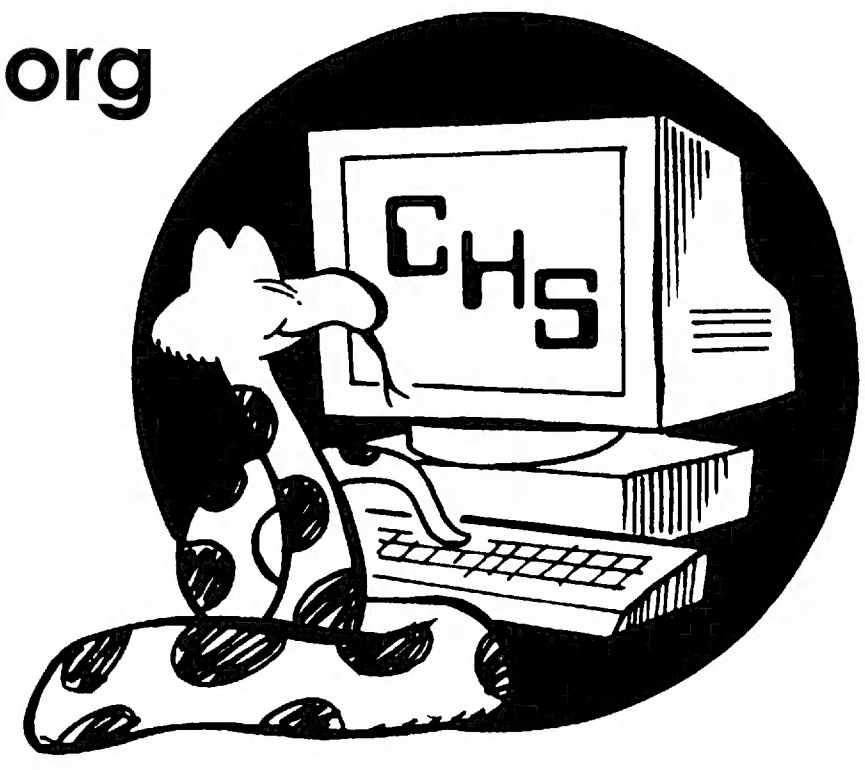

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CHS MEMBERS

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"I only have one animal and it's not very interesting"
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"I'm too busy"
Too busy to help the CHS with its biggest event of the year? If you can't be there the entire time, then just help for a couple hours Friday night, Saturday, or Sunday - every bit helps! Our goal is to get more people to participate - it makes it easier for everyone.

"I'm new to the society and don't know much about herps"
The public is just as interested in hearing about personal experiences with herps as more scientific info. Also, ReptileFest is a great place to learn from other CHS members!

"It sounds like more work than fun"
It certainly takes a lot of work to sponsor a big event like this. But it takes a lot of work to organize a big party, too. Ask anyone who has participated in years past - they'll tell you it's one of the best things they've done with the CHS.

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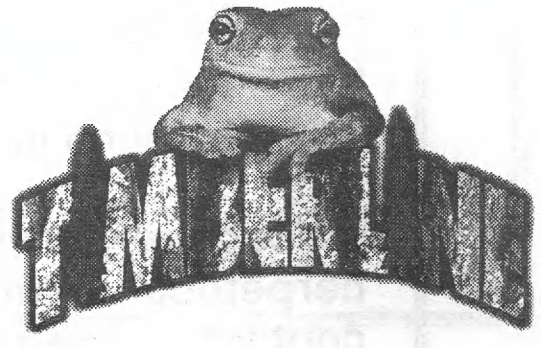


UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, February 26, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Gary Casper**, of the Milwaukee Public Museum, will speak on "Herp Research in the Lake Superior Basin." Gary's program will also include a question and answer session on the status of Wisconsin reptiles and amphibians.

The regular monthly meetings of the Chicago Herpetological Society now take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the March 14 board meeting, to be held at the North Park Village Administration Building, 5801 North Pulaski Road, Chicago. To get there take the Edens Expressway, I-94, and exit at Peterson eastbound. Go a mile east to Pulaski, turn right and go south to the first traffic light. Turn left at the light into the North Park Village complex. At the entrance is a stop sign and a guardhouse. When you come to a second stop sign, the administration building is the large building ahead and to your left. There is a free parking lot behind the building.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info call Lisa Koester, (773) 508-0034, or visit the CTC website: http://www.geocities.com/~chicagoturtle.

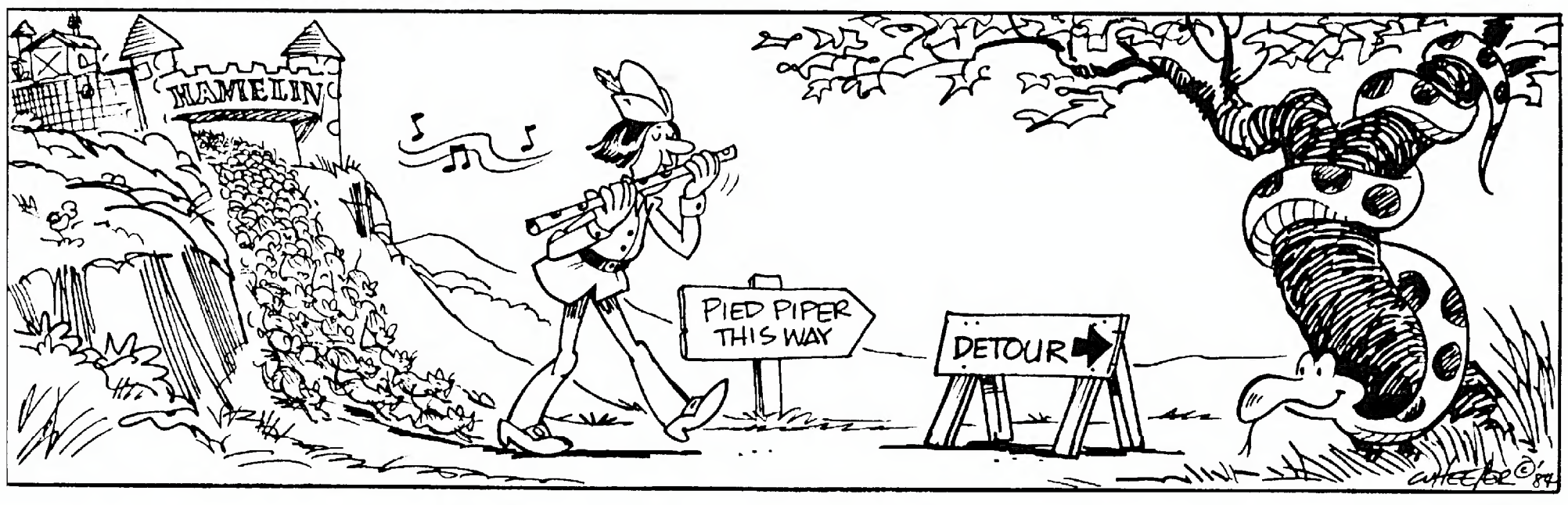
HERP OF THE MONTH

Each monthly meeting will showcase a different herp. CHS members are urged to bring one specimen of the "Herp of the Month" to be judged against the entries from other CHS members. Prizes will be awarded to the top three winners. In February, bring **any herp with an aberrant color or pattern**. In March it will be **horned frogs (*Ceratophrys* spp.) or pyxie frogs (*Pyxicephalus adspersus*)**.

2003 SALAMANDER SAFARI

This year, the annual CHS Salamander Safari will be held on Saturday, March 29, 9 A.M. – 3 P.M., beginning at the Plum Creek Nature Center at Goodenow Grove Forest Preserve in Will County. Goodenow Grove is south of Crete, Illinois, 1¼ miles east of the intersection of Route 1 and Route 394 on Goodenow Road. If you need directions to get to this area, call Ron Humbert at (630) 620-7377, or Tom Anton at (847) 441-7536. From the nature center we will drive to other Forest Preserve District of Will County sites to search for amphibians. Species found or heard calling in previous inventories include blue-spotted salamanders, gray treefrogs, spring peepers, chorus frogs, bullfrogs, green frogs, and northern leopard frogs. Species not yet found but possibly occurring (or occurring at preserves nearby) include spotted salamanders, newts and wood frogs. As in past safaris, CHS members are encouraged to bring interesting amphibians from their personal collections for photography and display purposes. Coffee, juice and donuts will be provided, and a good time will be had by all!

THE ADVENTURES OF SPOT



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